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was published in *Appalachia* for 1910, but a more complete report will be given in a forthcoming volume of the "Smithsonian Miscellaneous Collections," part of the expense of the work having been provided for by a grant from the Hodgkins Fund.

At the recent Harvard-Boston Aviation Meet Professor R. W. Willson established what is likely to become a standard method for determining the maximum height reached by an aeroplane in flight. A thermograph, which had been used at Blue Hill Observatory for obtaining the temperature encountered by a sounding balloon, and a water barometer were attached to the aeroplane. The atmospheric pressure prevailing at the highest point reached by the aviator was later corrected for the temperature recorded by the thermograph, and the actual height computed with the aid of the usual tables. As a check upon this height, simultaneous observations of angular altitude were made by means of transit instruments, one at each end of a measured base line, and the height computed from the triangle thus obtained. As the method gives two independent determinations of height, the desired accuracy is attained.

In an article in "*Umschau*" by Dr. Karl Stoeckel, attention is called to the fact that ultra-violet light, like the rays of radium, decompose water into hydrogen and hydrogen dioxide, without evolution of oxygen. It is believed that the ultra-violet rays of sunlight which fall upon the water vapor suspended in the lower strata of the earth's atmosphere decomposes a small part of it to produce hydrogen, which rises to great heights, and hydrogen dioxide, which has been found in small quantities in rain-water. From spectroscopic observations of high, luminous meteors, Professor Pickering has shown that hydrogen is undoubtedly present. Moreover, Professor J. Hann has calculated that 99.5 per cent. by volume of the atmosphere at a height of 62 miles is hydrogen. A slightly larger proportion, 99.84 per cent., is obtained by Dr. W. I. Humphreys, of the United States

Weather Bureau, in a recent research. It is not improbable that these facts will help to solve the problem of the upper inversion, as well as that of the slow desiccation of the earth.

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PUBLICATIONS ON THE INDIANS OF THE NORTHERN PLAINS

For several years the department of anthropology of the American Museum of Natural History has been engaged with a cultural survey of the Indian tribes occupying the northern plains: viz., the Sarcee, Northern Shoshone, Blackfoot, Crow, Gros Ventre, Assiniboine, Hidatsa, Mandan, Dakota, Plains Cree and Plains Ojibway. Though far from complete practically all of these tribes have been visited and systematic continuous investigation inaugurated for the next five or more years as the case may demand. The formulated results are now appearing in the "Anthropological Papers" of the American Museum of Natural History, seven papers having been issued to date, four of which were previously reviewed in *SCIENCE*, October 16, 1908. The three to be discussed here are: The Northern Shoshone, Vol. 2, Pt. 2, pp. 165-306, Plate I. and 20 text figures, January, 1909, and The Assiniboine, Vol. 4, Pt. 1, pp. 1-270, Plates I.-III., and 17 text figures, November, 1909, both by Robert H. Lowie; The Material Culture of the Blackfoot Indians, by Clark Wissler, pp. 1-176, Plates I.-VIII., and 103 text figures, March, 1910.

The Northern Shoshone.—In 1906 Dr. Robert H. Lowie began an investigation of the northern Shoshone, or Snake Indians. His results, as published, show that in economic life these Indians manifest predominately the traits of the plateau area west of the Great Divide, especially in the use of seed-grains and fish, the buffalo being little more than an incident in whose pursuit they made occasional journeys into the Missouri basin, a practise no doubt greatly stimulated by the acquisition of horses. In costume,

however, the northern Shoshone, like many of their southern relatives, bear a general resemblance to the plains type, but in the former use of the woven rabbit-skin robe and the exceptional use of the buffalo robe we have again plateau traits. The manufacture of coiled and twined basketry further differentiates them from the northern plains Indians, as do the absence of the elaborate medicine bundle, the sun dance and the men's societies. Decorative art seems, however, to have been strongly influenced by the northern plains; but while this influence is also evident in mythology, the predominating characteristics are those of the plateaus and California. Thus, on the whole, it appears that the older theory that the northern Shoshone formerly lived on the Missouri has no support, other than the traditions of battles among the Blackfoot, Crow, etc., all of which are probably based upon chance encounters with Shoshone hunting parties.

The Assiniboine.—Dr. Lowie also made a special study of the mythology and culture of two divisions of the Assiniboine, those at Morley, Alberta (1907), and those at Fort Belknap, Montana (1908). One of the important problems, here, arises from the assumed late separation of the Assiniboine from the Dakota and their subsequent association with the Cree between whom an important exchange of cultural traits must have occurred. Enough linguistic data were secured to show a distinct dialectic difference between these two divisions of the Assiniboine, suggesting that their separation from the Dakota must have been earlier than is really assumed. However, further investigation of the speech current among the various bands of Assiniboine now living in Saskatchewan will be necessary to a satisfactory conclusion. In mythology we again find evidence for the remoteness of the separation from the Dakota in so far that the Assiniboine show far less of the elementary Siouan characteristics than of the Algonkin. Among the close neighbors of the Assiniboine, toward whose mythologies are shown almost equally marked relationships, are the Ojibway, Cree, Blackfoot and

Gros Ventre, all highly individualized Algonkin tribes. Ceremonial organization is another aspect of culture, receiving special attention in this paper, one of the most striking points being that the Assiniboine have a number of ceremonial societies in which there is no conception of anything like a series or age gradation, but in which, nevertheless are shown certain other analogies in procedure and regalia to these widely distributed plains features. This result led the author to a special examination of the various tribal associations so far reported to determine in how far the age classification series holds for the area at large. His conclusion is that neither the age relationship nor any other conception can be taken as the controlling principle, but that each tribe has in a way constructed its societies by "the novel synthesis of singly wide-spread elements" and not by the complete adoption of any one organization. This is, of course, largely theoretical and in opposition to the sociological theories of Shurtz and Webster, but in line with the synthetic structure of the sun dance, pipe ceremonies, beaver ceremonies, etc., of the same area noted by American anthropologists. In addition to these major considerations the paper contains data on material culture, art, social organization and religion.

The Blackfoot.—In 1906 Dr. Wissler visited the Blackfoot Indians in Montana, giving special attention to their material culture, the subject of the latest publication in this series. In this paper fairly complete data are presented under the heads of food and its preparation, manufactures, transportation, shelter, dress and weapons. Taking these aspects of culture alone, the Blackfoot manifest no important traits not shared in almost equal measure by some of their immediate neighbors, so that it is impossible to credit them with tribal individuality or to determine their relative weight as a factor in the development of plains material culture. A critical examination of available historical data shows that there is no firm foundation for the current theory that the Blackfoot migrated to the plains from the forests of the

Mackenzie basin within two and a half centuries, the presumption being that they have occupied the plains for a long period, whence their want of individuality can not be explained as due to disorganization attendant to the hasty assimilation of a new culture. Sufficient comparative data have been introduced under the various headings to show the relative position of the Blackfoot in the northern plains group and, in turn, the relative position of this group in the area at large. It appears that the material culture of the northern plains tribes was relatively least influenced by the tribes of the plateaus on the west, but profoundly affected by acquisitions from the south and the east. Thus, while tradition gives the Blackfoot and Assiniboiné women of former times a costume like that of the Cree and Salteaux, within the historical period they have used the well-known form of the Kiowa, Ute, Arapaho and Dakota: again, the tipi of the Blackfoot, like that of the Crow, is of the type known to some Déné tribes and also the Salteaux, in contrast with the type used by the Arapaho, Dakota, *et al.* Throughout the paper a number of problems in the distribution of cultural traits have been defined for which additional data are needed, especially from the Cree and Central Algonkin tribes.

In closing, it seems in order to state that field-work among the Cree, Salteaux, Crow, Hidatsa, Mandan and Dakota has been sufficiently advanced to announce papers upon these tribes as the next issues of the series.

CLARK WISSLER

THE DISCOVERY OF FOSSIL MAMMALS IN
CUBA AND THEIR GREAT GEOGRAPH-
ICAL IMPORTANCE

FROM the standpoint of geographical evolution there was no more important announcement at the meeting of the Geological Congress at Stockholm than that of the discovery of a large mammalian fauna in the Pleistocene caves of central Cuba, by Professor de la Torre, of the University of Havana. Hitherto the known mammals of Cuba consisted of four living and one extinct species of rodents, and

one species of edentates, according to America's great naturalist, the late Professor E. D. Cope (whose conclusions were necessarily adopted by the writer as long ago as 1894). Messrs. Vaughan and Hayes, although not workers in vertebrate paleontology, in writing of Cuba discredited the occurrence of even these few fossils, as reported by other observers, and, furthermore, reported as wanting, any Jurassic formation in Cuba, although such had been found at an earlier date.

Professor de la Torre's collection embraces a large Pleistocene fauna of rodents, edentates and other vertebrates, as also excellent specimens of Jurassic fossils. Some of these were exhibited at Stockholm and others are at present at the American Museum of Natural History, New York. These Pleistocene mammals, or other immediate ancestors, must have reached the island of Cuba by land tongues, now submerged to 6,000 feet, except those by way of Florida (of which Cuba is the extension of the continental mass), which are now only 2,100 feet below sea-level. These submerged land tongues are themselves incised by cañons, which were once land features, and show the recent submergence of the whole Antillean region, which hypothesis was also accepted by Cope. The migrations of these animals confirms a late great continental elevation, which can not be ignored in any theory relating to the origin of the glacial period. From the biological point of view, these fossil remains are of extraordinary value, and Professor de la Torre is to be congratulated on his remarkable discovery.

Apropos, it may be stated that the writer has also himself obtained from a cavern near the boundary line, on the French and Dutch Island of St. Martin, the remains of *Amblyrhiza*, a Pleistocene rodent as large as a deer; notice of which has not hitherto been published. This rodent reached the northeastern Antilles from South America (Cope) by land tongues between the islands, now submerged, in one case to 4,000 feet.

The physiographic evidence of a similar late great elevation of Europe, based upon now submerged cañons, has also been shown by